REMARKS

Applicants respectfully request reconsideration of the present application in view of the foregoing amendments and in view of the reasons that follow.

Amendments to the Drawings:

Applicant proposes to amend Figure 18 in order to correct a minor error found in that figure. A marked-up Figure 18 showing the proposed change in red is attached, along with a replacement formal sheet for Figure 18.

Amendments to the Specification:

The specification has been amended to correct minor grammatical and typographical errors. No new matter is believed to have been added.

Status of Claims:

Claims 2, 5, 11, 14, 20 and 23 are currently being canceled.

Claims 1, 3, 4, 6-10, 12, 13, 15-19, 21, 22 and 24-27 are currently being amended.

Claims 28-33 are currently being added.

This amendment adds, cancels and amends claims in this application. A detailed listing of all claims that are, or were, in the application, irrespective of whether the claim(s) remain under examination in the application, is presented, with an appropriate defined status identifier.

After amending the claims as set forth above, claims 1, 3, 4, 6-10, 12, 13, 15-19, 21, 22 and 24-33 are now pending in this application.

Indication of Allowable Subject Matter:

Applicants appreciate the indication in the Office Action that claims 3, 7, 12, 16, 21 and 25 contain allowable subject matter.

Claim Rejections - Indefiniteness:

In the Office Action, claims 5-9, 14-18 and 23-27 were rejected under 35 U.S.C. § 112, second paragraph, as being indefinite, for the reasons set forth on

page 2 of the Office Action. These claims have been amended in accordance with the comments made on page 2 of the Office Action, and it is submitted that these claims are now fully compliant with 35 U.S.C. § 112, second paragraph.

Claim Rejections – Prior Art:

In the Office Action, claims 1, 2, 4, 10, 11, 13, 19, 20 and 22 were rejected under 35 U.S.C. § 103 (a) as being unpatentable over U.S. Patent No. 6,721,462 to Okabayashi et al.; and claims 5, 6, 8, 9, 14, 15, 17, 18, 23, 24, 26 and 27 were rejected under 35 U.S.C. § 103 (a) as being unpatentable over U.S. Patent No. 6,721,462 to Okabayashi et al. in view of U.S. Patent No. 5,146,228 to Irani. These rejections are traversed with respect to the presently pending claims under rejection, for at least the reasons given below.

Description of Invention:

Presently pending independent claim 1 has been amended to include the features of now-canceled claims 2 and 5, and also to more clearly define the accumulation addition between the similarity degree images. Similar amendments have been made to presently pending independent claims 10 and 19.

Before addressing the cited art of record, a brief explanation of the present invention will be provided herein. The present invention relates to a technology of searching corresponding points between an input image and a reference image to be compared with the input image. One of the objects of the invention is to rapidly and stably obtain the corresponding points without getting a local solution (see paragraph 0001 of the published specification).

According to the present invention, as recited in the presently pending independent claims, the reference image (see Figure 2A) is divided into a plurality of blocks to generate a plurality of reference partial images (see Figure 3), and the input image is divided into a plurality of blocks to generate a plurality of input partial images (see Figure 4). Similarity degrees between the input partial images and the reference images are then calculated to generate a

plurality of similarity degree images (see the enclosed copy of Figure 6, with markups to aid in the explanation), each having the similarity degrees as a plurality of pixel values (see paragraphs 0046 to 0048 of the published specification). The similarity degree images include a first similarity degree image and a second similarity degree image. A first pixel selected from a group of pixels including one pixel and a plurality of pixels surrounding the one pixel in the first similarity degree image is added to a second pixel value of a second pixel in the second similarity degree image (see the enclosed copy of Figure 6 with markups). A coordinate of the one pixel in a block defined by each similarity degree image corresponds to that of the second pixel. The corresponding points are then detected based on the similarity degree images which have been accumulatively added (see Figures 7 to 13, and paragraphs 0049 to 0065 of the published application). As a result, as described in paragraphs 0082 to 0086, it is possible to detect any distortion or deformation in the input image such that verification accuracy between the input image and the reference image can be improved.

For example, as shown in the enclosed copies of Figure 6 and Figure 8 (both with markups added to aid in understanding the invention), when the addition is carried out in the j direction, the pixel value of the first pixel of the similarity degree image A is added to that of the second pixel in the similarity degree image B. The first pixel is a pixel selected from a group of pixels surrounded by the solid-lined square in the image A in Figure 8. The coordinate of the shaded pixel at the center of the group of pixels in the image A corresponds substantially to that of the second pixel in the image B.

According to claims 9, 18 and 27, the pixel value of the pixel having the maximum pixel value from the group of pixels in the image A is selected as the first pixel to be added to the second pixel in the image B. This addition is sequentially carried out for all or some (e.g., every second pixel) of the pixels in the image B.

According to new claims 28 to 30, after the sequential additions between the images A and B, those between the images B and C shown in the enclosed

Figure 6 are carried out, and so on, accumulatively for all the similarity degree images at least in one of the directions shown in Figure 7. Of course, the accumulative additions can be carried out for some of the similarity degree images (e.g., every second similarity degree image).

Discussion of the Cited Art of Record:

The Office Action asserts that the features recited in the independent claims and in dependent claims 2, 4, 11, 13, 20 and 22 are anticipated by Okabayashi, and that the features recited in dependent claims 5, 6, 8, 9, 14, 15, 17, 18, 23, 24, 26 and 27 are unpatentable over the combination of Okabayashi and Irani. However, these rejections are traversed with respect to the presently pending claims.

In particular, Okabayashi discloses searching a reference image from a search image by dividing the search image into partial area images and calculating correlation values between each partial area image and the reference image, to generate a distribution of correlation values as shown in Figure 7 of that reference. Okabayashi also relates to a technology dealing with hardware for realizing a correlation operation. However, Okabayashi fails to disclose or suggest anything concerning the accumulation addition between similarity images as recited in the presently pending independent claims.

With respect to the rejection based on the combination of Okabayashi and Irani, Irani discloses finding to which positions in a previously captured image (reference map) each of images (sensed images) captured from the sky corresponds. However, Irani merely discloses simply superposing correlation surfaces to add them together so as to extract portions having the highest correlation value from the added surfaces, as shown in Figure 4 of that reference. Irani fails to disclose or suggest anything concerning the distinctive selection and addition of a first pixel value to a second pixel value as recited in the presently pending independent claims.

Accordingly, all of the presently pending claims are patentable over the cited art of record.

Conclusion:

Therefore, since there are no other objections or rejections raised in the Office Action that have not been addressed in the Amendment and Reply, Applicants believe that the present application is now in condition for allowance, and an early indication of allowance is respectfully requested.

The Examiner is invited to contact the undersigned by telephone if it is felt that a telephone interview would advance the prosecution of the present application.

The Commissioner is hereby authorized to charge any additional fees which may be required regarding this application under 37 C.F.R. §§ 1.16-1.17, or credit any overpayment, to Deposit Account No. 19-0741. Should no proper payment be enclosed herewith, as by a check being in the wrong amount, unsigned, post-dated, otherwise improper or informal or even entirely missing, the Commissioner is authorized to charge the unpaid amount to Deposit Account No. 19-0741. If any extensions of time are needed for timely acceptance of papers submitted herewith, Applicant hereby petitions for such extension under 37 C.F.R. §1.136 and authorizes payment of any such extensions fees to Deposit Account No. 19-0741.

Respectfully submitted,

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Amendments to the Drawings:

Applicants propose to amend Figure 18, as provided herein on a marked-up copy of Figure 18. In particular, step S403 has been amended to correct a minor error found in that step. A replacement formal drawing sheet for Figure 18 is also being provided herein.

Marked-Up Drawings for Figure 6 and Figure 8 Follow this Dividing Sheet, whereby those Marked-Up Drawings are discussed in the Remarks section so as to better explain the present invention.

FIG.6

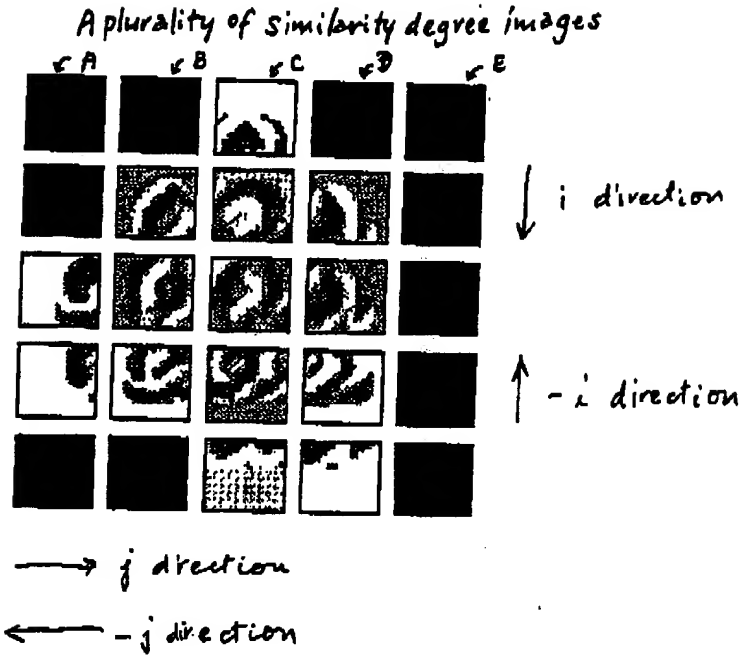


FIG.8

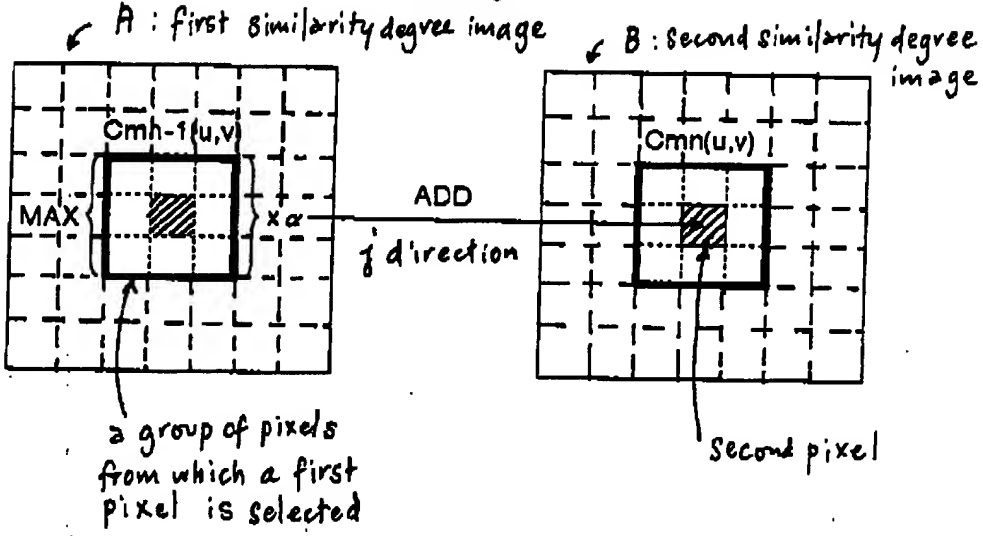
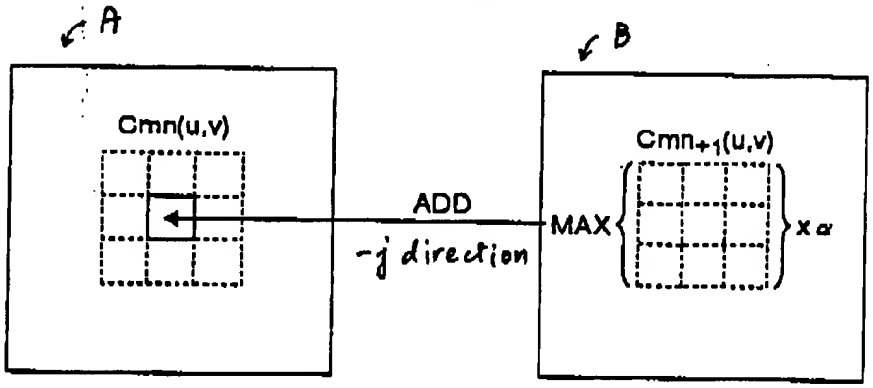


FIG.9



A Marked-Up Drawing and a Replacement Formal Drawing for Figure 18 Follow this Dividing Sheet.

FIG.18